

Patent Claims

1. A mixture of powders suitable for preparation of absorbable calcium phosphate cements comprising:
  - 5 tricalcium phosphate (TCP) in which,
    - 30 to 70% of the TCP particles have a particle size of 0.1 to 7um and
    - 10 to 60% of the TCP particles have a particle size of 40 to 100 um;
  - 10 precipitated hydroxylapatite (PHA) wherein the PHA is a cation-deficient hydroxylapatite of the formula I
$$\text{Ca}_{8.75}\text{V}(\text{Ca})_{1.25}[(\text{HPO}_4)_{5.5-x}(\text{CO}_3)_{0.5}] (\text{OH})_x\text{V}(\text{OH})_{2-x}$$
 in which x is 0-2 ;and
  - 15 at least one other phosphate -containing inorganic compound.
2. A mixture according to claim 1, wherein said mixture after hardening has a compressive strength of between 70 - 80 Mpa.
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3. A mixture according to claim 1, wherein the PHA has a particle size of 0.5- 10 um.
- 25 4. A mixture according to claim 3, wherein the PHA has a particle size of 0.5 - 5 um.
- 30 5. A mixture according to claim 1, wherein the PHA content is from 1 - 5% by weight, based on the total dry mass.
- 35 6. A mixture according to claim 1, wherein the PHA content is from 1.7 - 2.7 % by weight, based on the total dry mass.
7. A mixture according to claim 1, wherein said at least one other phosphate-containing inorganic compound is selected from  $\text{CaHPO}_4$ , carbonate-containing apatite and  $\text{CaCO}_3$ .

8. A mixture according to claim 1, additionally comprising a setting accelerator.

5 9. A mixture according to claim 1, additionally comprising a pharmaceutically active ingredient.

10 10. A mixture according to claim 9, wherein said pharmaceutically active ingredient is an antibiotic or disinfectant.

15 11. A mixture according to claim 1, present in the form of an aqueous solution, suspension or paste.

16 12. A biodegradable implant produced from a hardened mixture according to claim 11.

20 13. A method of preparing biodegradable implantable synthetic bone materials comprising, hardening a mixture according to claim 1.

25 14. A mixture according to claim 9, wherein said pharmaceutically active ingredient is a growth factor or a prostaglandin.

30 15. A mixture according to claim 14, wherein said growth factor is a bone morphogenic protein, a tissue growth factor, a fibroblast growth factor, or a growth factor from the TGF $\beta$  superfamily.

35 16. An absorbable calcium phosphate cement paste comprising cement powders according to claim 1, and a liquid phase.

17. A kit for the preparation of a bio-cement paste comprising a mixture of powders according to claim 1, a pharmaceutical active ingredient and a liquid phase.

18. A method of preparing a precipitated hydroxylapatite (PHA) comprising:

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homogenously mixing  $\text{CaSO}_4$ ,  $\text{Na}_3\text{PO}_4$ ,  $\text{CaCO}_3$  in an aqueous solution;

10 dissolving at least one magnesium salt into aqueous solution;

removing resultant precipitate and

washing with a neutral electrolyte.

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19. A method according to claim 18, in which the magnesium salt is magnesium chloride, magnesium sulfate, magnesium nitrate or one or more of their hydrates.

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20. A method of repairing bone fractures comprising applying an absorbable calcium phosphate paste according to claim 16, to a bone fracture.